Cardiac Monitoring in Stroke Units: Importance of Diagnosing Atrial Fibrillation in Acute Ischemic Stroke

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**INTRODUCTION**

Patients with transient ischemic attack (TIA) or established stroke are those most at risk of recurrence (10.5% at 90 days), and this is greatest in the first week.1

Cardiogenic embolism causes 20% of strokes, and atrial fibrillation (AF) 50%. The most common form, nonvalvular, occurs in 6% of patients aged 65 and arrhythmia is the principal cause in older patients. Both AF and paroxysmal AF (PAF) clearly indicate risk of a first or recurrent stroke and are associated with poor prognosis. Recurrent events may account for 12%-30% per year.2

Given that anticoagulation therapy reduces risk of recurrence, detecting AF after stroke is fundamental to optimizing treatment but underdiagnosis of AF continues. Over 30% of patients are unaware of their diagnosis and 25% of those with stroke had no previous diagnosis. Moreover, in 30% the pattern is intermittent.

Due to the low sensitivity of standard electrocardiography, 24-hour ECG recording (Holter) is frequently used.3 Holter facilitates detection of previously unknown AF in approximately 2% of patients with stroke. If recording is extended from 24 to 72 hours, frequency of PAF increases from 1.2% to 6.1%, indicating that longer recording times improve chances of detection.4

Several studies show care of patients with acute cerebrovascular disease in the stroke unit (SU) reduces morbidity and mortality, and need for

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**Monitorización cardiaca en la unidad de ictus: importancia del diagnóstico de fibrilación auricular en el ictus isquémico agudo**

La fibrilación auricular (FA) es un factor de riesgo independiente y predictor de mal pronóstico en el ictus. La unidad de ictus (UI) prolonga la monitorización cardiaca. El objetivo del estudio fue determinar la frecuencia de FA detectada en la UI y el porcentaje de pacientes con ictus isquémico o accidente isquémico transitorio a quienes se dio tratamiento anticoagulante.

Se incluyó a 465 pacientes monitorizados en la UI durante una media de 54,55 ± 35,74 h. Se detectó FA en 33 (el 48,5%, FA paroxística, y el 51,5%, FA persistente). El factor de riesgo más frecuente fue la hipertensión arterial. Se inició tratamiento anticoagulante en el 57,5%.

Concluimos que la monitorización en la UI es útil para la detección de FA en el ictus agudo y modifica el tratamiento en más de la mitad de los pacientes afectados.

**Palabras clave:** Fibrilación auricular. Unidad de ictus. Tratamiento anticoagulante.
admission.\(^5\) Admission of patients with stroke to SU would prolong cardiac monitoring and facilitate detection of previously unknown persistent AF (pAF) or PAF.

**METHODS**

We conducted a prospective, descriptive study from June 2005 to July 2007 with 722 patients hospitalized with ischemic stroke or TIA, out of 1274 stroke patients admitted to the Hospital del Mar, Barcelona, Spain. Neurologic emergencies are admitted from 2 districts (Sant Martí and Ciutat Vella), with a population of 344,959 (in 2006). Patients with a known history of AF, previous anticoagulant therapy or hemorrhagic stroke were excluded.

We collected demographic and clinical data (prejudicial habits, cardiovascular risk factors, antecedents of stroke, and cardiac arrhythmias), severity of stroke, and prognosis. We conducted neurovascular studies (transcranial Doppler, carotid duplex, cranial computerized tomography [CT], 12-lead ECG and cranial magnetic resonance [MR]) in patients with initial cranial CT without lesions. Selected patients underwent echocardiography.

The SU neurology room has 4 beds. Inclusion criteria (acute phase stroke, slight or moderate neurologic deficit or TIA, with no age limit) were the Spanish Society of Neurology study group on cerebrovascular disease, 2004 guidelines for treatment and prevention of stroke.

Monitoring was performed with Dash 2000 (GE Medical Systems) equipment. The acoustic alarm activated on detecting an irregular rhythm or 100 bpm heart rate. After activation, nursing staff perform a standard ECG and call the neurologist to evaluate the patient's condition.

Neurologic deficit severity is determined with the National Institute of Health Stroke Scale (NIHSS). A score of <5 is considered a minor deficit. The modified Rankin scale (mRS) was used to quantify incapacity, with 0-2 considered independent.

Stroke subtype was classified according to the internationally-accepted Trial of Org 10172 in Acute Stroke Treatment (TOAST).

Current CC/AHA/ESC clinical guidelines consider AF is recognized in the ECG by absence of P waves, the isoelectric line being replaced by irregular, high frequency oscillations (f waves) and wholly irregular ventricular response. Paroxysmal AF is defined as self-limited episodes (<30 s) ending spontaneously within 7 days (generally in the first 24 hours). Episodes of >7 days are termed persistent AF and require therapeutic intervention (drugs or electric cardioversion). Permanent AF is usually defined as AF of >1 year, for which cardioversion has failed or not been attempted.\(^6\) We compared patient characteristics according to whether they presented paroxysmal or persistent AF.

Statistical analysis was with SPSS 13.0. Data are given as mean (SD) or medians for quantitative variables, and n (%) for qualitative variables. Quantitative variables were compared with Student t test and qualitative variables with \(\chi^2\). A P value less than .05 was considered significant.

**RESULTS**

We enrolled 461 patients with ischemic stroke and 4 with TIA (64% of the total) who remained in the SU for 54.55 (35.74) hours. We detected AF in 33 (7%): PAF in 16 (3.4%) and persistent AF in 17 (3.65%). Monitoring continued for 45.6 (23.86) hours. Characteristics of the 2 groups are in Table. We found no significant differences in demographic data or vascular risk factors between groups. At admission, these 33 patients were diagnosed with stroke of undefined cause, which was later modified to cardioembolic stroke. In the PAF group, 9 (56.25%) began anticoagulant therapy and 5 (31.25%) antiplatelet therapy, due to the high risk of hemorrhagic transformation in the acute phase due to the size of the cerebral lesion; the other 2 patients died without receiving antithrombotic treatment. In the persistent AF group, 10 (59%) patients began anticoagulant therapy and 5 (29.4%) antiplatelet therapy, for the previously-mentioned indications. In the other 2, treatment was not indicated due to social disadvantage and death. The most frequently prescribed antiarrhythmic drug was Amiodarone prior to cardioversion or to maintain sinus rhythm.

**DISCUSSION**

Atrial fibrillation is the most frequent cardiac arrhythmia and its prevalence is increasing with the aging population and improvements in ischemic heart disease and heart failure management. Descriptions of the epidemiology of AF have been based on hospital or population-wide records that underestimate the percentage of patients affected. A similar difference is found in associated risk factors—the most prevalent being hypertension (HT), in population-wide studies, and ischemic heart disease and heart failure in hospital-based studies.\(^7\) In our study HT is the most prevalent risk factor.

Studies referring to AF detection in patients admitted for stroke present contradictory results because they ignore the systematic use of 24-hour Holter and echocardiograms. Recently, several articles have tried to determine cardiology study indications. Schaer et al\(^8\) analyzed patients with...
Amiodarone was the antiarrhythmic drug most often chosen, in order to maintain sinus rhythm. At the time of writing, studies comparing strategies to control rhythm or heart rate show no significant differences between these for mortality, increased bleeding, or thromboembolic episodes.6 The AFFIRM study associated risk of ischemic stroke with absence of anticoagulation therapy or dosage levels too low to meet therapeutic needs. So, independently of the use of heart rate control strategies, anticoagulation therapy is fundamental in managing patients with AF and risk of stroke.12

In conclusion, our study indicates that continuous cardiac monitoring in the SU, during at least 48 hours following admission, should be part of standard management practice for detecting AF since it helps determine stroke etiology and optimizes later treatment.

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REFERENCES


<table>
<thead>
<tr>
<th>Characteristics of Groups With PAF Versus pAF</th>
<th>PAF (n=16)</th>
<th>pAF (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD), y</td>
<td>79.8 (7.3)</td>
<td>78.5 (7.1)</td>
</tr>
<tr>
<td>Women, n (%)</td>
<td>9 (56.3)</td>
<td>12 (70.6)</td>
</tr>
<tr>
<td>HT, n (%)</td>
<td>14 (87.5)</td>
<td>17 (100)</td>
</tr>
<tr>
<td>Dyslipidemia, n (%)</td>
<td>6 (37.5)</td>
<td>5 (29.4)</td>
</tr>
<tr>
<td>Diabetes mellitus, n (%)</td>
<td>8 (50)</td>
<td>4 (23.5)</td>
</tr>
<tr>
<td>mRS at discharge, median</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>TOAST at discharge</td>
<td>Cardioembolic</td>
<td>Cardioembolic</td>
</tr>
<tr>
<td>Transthoracic echocardiography performed, n (%)</td>
<td>6 (37.5)</td>
<td>8 (47)</td>
</tr>
<tr>
<td>Left atrium size, mean (SD), mm</td>
<td>39.7 (4)</td>
<td>43 (8.2)</td>
</tr>
<tr>
<td>Anticoagulant therapy at discharge, n (%)</td>
<td>9 (56.3)</td>
<td>10 (59)</td>
</tr>
<tr>
<td>Antiplatelet therapy at discharge, n (%)</td>
<td>5 (31.3)</td>
<td>5 (29.4)</td>
</tr>
<tr>
<td>Antiarrhythmic treatment at discharge, n (%)</td>
<td>No</td>
<td>4 (23.5)</td>
</tr>
<tr>
<td>Beta-blockers</td>
<td>1 (6.3)</td>
<td>1 (6)</td>
</tr>
<tr>
<td>Calcium channel blockers</td>
<td>1 (6.3)</td>
<td>2 (11.8)</td>
</tr>
<tr>
<td>Digoxin</td>
<td>2 (12.5)</td>
<td>6 (35.3)</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>7 (43.8)</td>
<td>4 (23.5)</td>
</tr>
</tbody>
</table>

pAF indicates persistent atrial fibrillation; mRS, modified Rankin scale; NIHSS, National Institute of Health Stroke Scale; PAF, paroxysmal atrial fibrillation; SD, standard deviation.

Non-statistically significant differences (P>.05).